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(21) International Application Number: <b>PCT/US99/01992</b> (22) International Filing Date: <b>29 January 1999 (29.01.99)</b> (30) Priority Data: <b>09/016,256 30 January 1998 (30.01.98) US</b> (71) Applicant: <b>THE PROCTER &amp; GAMBLE COMPANY [US/US]; One Procter &amp; Gamble Plaza, Cincinnati, OH 45202 (US).</b> (72) Inventors: <b>VILLAGRAN, Francisco, Valentino; 6161 Indian Trail, West Chester, OH 45069 (US). SMALL, Leonard, Edwin; 1083 Summyslope Drive, Cincinnati, OH 45229 (US).</b> (74) Agents: <b>REED, T., David et al.; The Procter &amp; Gamble Company, 5299 Spring Grove Avenue, Cincinnati, OH 45217-1087 (US).</b>	(81) Designated States: <b>AL, AM, AT, AT (Utility model), AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, CZ (Utility model), DE, DE (Utility model), DK, DK (Utility model), EE, EE (Utility model), ES, FI, FI (Utility model), GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KR, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SK (Utility model), SL, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).</b>  Published With international search report.	
(54) Title: <b>SWEETENING AGENT</b>		
(57) Abstract  The present invention relates to a sweetening agent for use in various ready-to-eat/drink and instant foods and beverages. Said agent comprises: 1. from about 90 to about 99.5 % sucrose, fructose, lactose, glucose, or any mixtures thereof; 2. from about 0.001 to about 5 % aspartame; and 3. from about 0.001 to about 5 % acesulfame K. The sweetening agent of the present invention can be used in medicinal, as well as food and beverage products. It is particularly preferred in those food compositions where a high content of solid materials (e.g. generally greater than 12 %) have been conventionally used. The sweetening agent is suitable for use in instant and ready-to-serve beverages (flavored and unflavored coffees and teas, hot chocolate, juice-containing beverages, nutritional drinks in the form of shakes, spreads, sour cream; vegetable dips and/or spreads; icings; whipped toppings; frozen confections; milk; coffee whitener; coffee lighteners; and dips and spreads. The blend of sugar (sucrose, fructose, lactose, glucose or any mixture thereof) and alternative sweeteners (aspartame and acesulfame K) allows for the reduction of solids (quantity of powder) needed to prepare a many food or beverage products (e.g. soft drink, gelatin dessert, frozen desserts and the like). The blend of sugar and sweeteners show a higher increase in sweetness than would be expected from adding the three together. The sweetening agent of the present invention also imparts increase in flavor and richness of the beverage or food prepared; alternative sweeteners act as flavor enhancers. Additionally, the sweetening agent of the present invention does not produce the typical aftertaste associated with the alternative sweeteners, generally attributed to be a bitter aftertaste of aspartame.		

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## SWEETENING AGENT

### TECHNICAL FIELD

The present invention relates to a sweetening agent useful for providing higher intensity sweetness with enhanced flavor and mouthfeel and substantially no aftertaste for use in food, beverage, and medicinal products. The sweetening agent of the present invention also allows reduction in the level of solids in ready-to-eat/drink and instant food and beverage products so as to achieve the desired mouthfeel in the product with a lower level of solids.

### BACKGROUND

Sweeteners are often added to food and beverage products, particularly instant and ready-to-eat/drink foods and beverages, to increase the acceptance of these products by consumers. In ready-to-eat/drink and instant products, there is often an issue with the amount of solids used when a particular mouthfeel, texture, and/or taste is required. Sweeteners add to the solids content, and the solids necessary to impart the desired attributes (aside from sweetness) of the food and beverage must be taken into consideration by the formulator.

Accordingly, there is a need for a sweetener that will impart sweetness and allow reduction of solids at the same time. This has been attempted by those in the foods/beverage industry using many techniques. One of the most common methods has been blending sweeteners. For example, WO9620608A1 describes a method for producing a chewing gum which has delayed release of a combination of sweeteners (aspartame and acesulfame K). The delayed release sweetener combination is achieved by physical modification of sweetener properties using coating and drying. US 5,527,554 discloses a frozen dessert made without sucrose or corn syrup solids; lactitol and hydrogenated starch hydrolyzates are used as bulk sweeteners in addition to aspartame, acesulfame K or other artificial sweeteners. US 4,737,368 describes a blend of a mono- and disaccharide base sweetener composition which consists essentially of a blend of sucrose and fructose useful for sweetening a wide variety of foodstuffs and other edible formulations. Ayya, N and Lawless, HT (Quantitative and qualitative evaluation of high intensity sweeteners and sweetener mixtures; Chemical senses; 17 (3) 245-259) reported that blends of sucrose/aspartame and acesulfame K/saccharin did not exhibit sweetness synergy (hyperadditivity evaluated by comparing predicted to observed sweetness scores). Hyperadditivity was observed in aspartame/acesulfame K blends. However, these blends of sweeteners impart a typical (usually perceived as negative) aftertaste to the products to which they are added.

It has surprisingly been found that a blend of sugar (sucrose, fructose, lactose, or glucose, and any mixture thereof), aspartame and acesulfame K not only gives high intensity sweetness, but also enhances the flavor of the food and beverage products. Additionally, because of the high intensity sweetness, the

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amount of solids necessary to provide desired flavor, mouthfeel and/or texture in the food and beverage products can also be reduced. This is particularly desirable in instant and ready-to-eat/drink foods and beverages.

Formulators are, generally, attempting to limit the amount of solids in food and beverage products because of various considerations. Many of these food and beverage products are sold ready-to-eat/drink, and usually have 10 - 20% solids. Many of these products are sold to the consumer in dry mix form as an "instant" product and the consumer prepares the final form to be consumed using water, milk, juice or other suitable liquid. If the solids level cannot be easily and reliably controlled when the instant product is reconstituted by the consumer, then the consumer may perceive these products as thin and watery.

Mouthfeel, richness, creaminess, sweetness and flavor impact can be increased by delivering a higher dosage of solids. However, a higher level of solids requires larger volume of product to be used. Generally, this translates to formulation difficulties which vary, given the end-application of the food and beverage product. For instance, in instant beverage products, this usually translates to an increase in the amount of dry product (usually the number of spoonfuls) necessary to prepare the beverage. For puddings, mousses, dressings, gravies, and sauces, the amount of dry material necessary to make the final product increases dramatically. This leads to increased size of packaging necessary for the same amount of finished, consumable products; packaging would have to be, either, enlarged to get the same amount of servings of food to be consumed (this leads to environmental and storage issues), or the consumer would get less servings out of the current packaging size (this leads to consumer inconvenience). Additionally, at high levels of solids, flavor and mouthfeel can be distorted. High levels of solids can lead to higher level of fat and/or calories as well as increased cost.

Accordingly, it would be desirable to have a sweetener with substantially no aftertaste that will allow the reduction in solids in foods and beverages, as well as enhance the flavor of the product.

#### SUMMARY OF THE INVENTION

The present invention relates to a sweetening agent for use in various medicinal products, as well as food and beverage products, particularly ready-to-eat/drink and instant foods and beverages. Said agent comprises:

1. from about 90 to about 99.5% sucrose, fructose, lactose or glucose, or any mixture thereof;
2. from about 0.001 to about 5% aspartame; and
3. from about 0.001 to about 5% acesulfame K.

The sweetening agent of the present invention can be used in any consumable products including food, beverage, and medicinal products. It is particularly preferred in those food compositions where a high content of solid materials (e.g. generally greater than 12%) have been conventionally used. The

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sweetening agent is suitable for use in all food and beverage products, but is especially suitable for use in instant and ready-to-serve beverages (flavored and unflavored coffees and teas, hot chocolate, juice-containing beverages, nutritional drinks in the form of shakes, malts, and the like (e.g. Ensure®); puddings; sauces; gravies; dressings; mousses; ice cream; yogurt; cream cheese; cheese dips and/or spreads; sour cream; vegetable dips and/or spreads; icings; whipped toppings; frozen confections; milk; coffee whitener; coffee lighteners; and dips and spreads.

The blend of sugar (sucrose, fructose, lactose, glucose, or any mixture thereof) and alternative sweeteners (aspartame and acesulfame K) allows for the reduction of solids (quantity of powder) needed to prepare many food or beverage products (e.g. soft drink, gelatin dessert, frozen desserts and the like).

The blend of sugar and alternative sweeteners show a higher increase in sweetness and/or richness than would be expected from adding the three together.

The sweetening agent of the present invention also imparts increase in flavor and richness of the beverage or food prepared; as the alternative sweeteners used in the blend may act as flavor enhancers. Additionally, the sweetening agent of the present invention does not produce the typical aftertaste associated with the alternative sweeteners, generally attributed to be a bitter aftertaste of aspartame.

#### DETAILED DESCRIPTION OF THE PRESENT INVENTION

##### **A. Definitions**

The term "sugar" as used herein refers to sucrose, fructose, lactose, glucose, or any mixture thereof. "Sucrose", as used herein, refers to cane sugar, beet sugar, or mixtures thereof, and has the chemical formula  $C_{12}H_{22}O_{11}$ . "Fructose", as used herein refers to levulose or fruit sugar, or mixtures thereof, and has the chemical formula  $C_6H_{12}O_6$ . The term "lactose", as used herein refers to milk sugar and has the chemical formula  $C_{12}H_{22}O_{11} \cdot H_2O$ . The term "glucose", as used herein refers to Dextrose or Grape Sugar, or any mixture thereof, and has the chemical composition  $C_6H_{12}O_6 \cdot (H_2O)$ .

The terms "alternative sweetener", "artificial sweetener", "non-caloric sweetener", and "high intensity sweetener", are used interchangeably herein and refers to aspartame and acesulfame K.

As used herein, the terms "ready-to-serve" food or beverage; "ready-to-eat" food; "ready-to-drink" beverage, are used interchangeably to refer to food and beverage products that are in a ready-to-use, consumable form.

As used herein, the terms "instant" and "soluble", as they relate to food and beverage products, are used interchangeably to refer to food and beverage products, such as instant or soluble coffee products, that are relatively soluble in water, especially hot water. A mix (either in powder, dry mix, concentrate or emulsion form) is sold by the manufacturer and is typically mixed by the consumer with an aqueous liquid or diluent, i.e., water, milk or other aqueous medium, to provide a ready-to-serve food or beverage.

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The term "medicinal", as used herein; refers to any pharmaceutical or over-the-counter preparation, as well as any nutritional supplement. Said product can be solid, liquid, powder or emulsion, or the like, in any product form that can be taken orally by an individual subject.

"Bulk density" refers to the overall density of a plurality of particles measured in the manner described on pp. 127-131 of COFFEE PROCESSING TECHNOLOGY, Avi Publishing Company, Westport, Conn., 1963, Vol. II.

The terms "moisture" and "water" are used interchangeably herein.

All particle sizes referred to herein are based on the U.S. Standard Sieve Screen Series. See page 701 of Sivetz & Desrosier, COFFEE TECHNOLOGY (Avi Publishing Co. 1979).

As used herein, the term "solids" are used to refer to all water-insoluble components and water-soluble components.

As used herein, the term "comprising" means various components and processing steps can be conjointly employed in the sweetening agent and the food and beverage products made therewith, and process for preparing the sweetening agent according to the present invention. Accordingly, the term "comprising" encompasses the more restrictive terms "consisting essentially of" and "consisting of."

All amounts, parts, ratios and percentages used herein are by weight unless otherwise specified.

#### B. The Sweetening Agent

The sweetening agent of the present invention comprises from 90 - 99.5%, more preferably from about 95 to about 99.3%, most preferably from about 96 to about 99.2% sugar; from about 0.001 to about 5% aspartame, more preferably from about 0.005 to about 1.0% aspartame, most preferably from about 0.01 to about 0.1% aspartame; and from about 0.001 to about 5% acesulfame K, more preferably from about 0.005 to about 1.0% acesulfame K, most preferably from about 0.01% to about 0.1% acesulfame K. The sugars for use in the sweetening agent of the present invention are sucrose, fructose, lactose, and glucose, as well as any mixtures thereof. The higher intensity sweeteners for use in the sweetening agent of the present invention include acesulfame K (Sunette™), and L-aspartyl-L-phenylalanine lower alkyl ester sweeteners (e.g., aspartame) and any mixtures thereof. A particularly preferred sweetener system is a combination of sucrose with aspartame and acesulfame K, for example a mixture of 98.4% sucrose, 0.8% aspartame and 0.8% acesulfame K. Another preferred composition according to the present invention comprises 99.2% sucrose, 0.4% aspartame and 0.4% acesulfame K. Another preferred composition according to the present invention comprise 99.4% sucrose, 0.3% aspartame, and 0.3% acesulfame K.

The preferred method for preparing the sweetening agent of the present invention is using dry mixing techniques generally employed by, and readily available to, one of ordinary skill in the art.

#### Example I

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A sweetening agent (1000 g.) is prepared from the following ingredients:

Ingredient	Grams
Sucrose	984
Aspartame	8
Acesulfame K	8

All of the ingredients are placed in a Hobart mixer and mixed for 5 minutes.

#### Example 2

A sweetening agent (1000 g.) is prepared from the following ingredients:

Ingredient	Grams
Sucrose	497
Fructose	497
Aspartame	3.0
Acesulfame K	3.0

All of the ingredients are placed in a Hobart mixer and mixed for 5 minutes.

#### Example 3

A sweetening agent is made as set forth in Example 1 or Example 2, except that all or part of the sucrose and/or fructose is substituted with glucose and/or lactose.

#### Example 4

A flavored soft drink mix (1000 g.) is prepared from the following ingredients:

Ingredient	Grams
Sucrose	826
Aspartame	4.0
Acesulfame K	4.0
Citric Acid	56
Calcium phosphate	27.5
Sodium citrate	27.5
Ascorbic acid	27.5
Flavorants	27.5

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All of the ingredients are placed in a Hobart mixer and mixed for 5 minutes.

Flavored soft drink beverage. A beverage (1000 ml) is prepared by mixing 26 grams of the dry mix and adding 974 ml of water.

**Example 5**

A gelatin dessert mix (1000 g.) is prepared from the following ingredients:

Ingredient	Grams
Sucrose	382
Fructose	254
Gelatin	227
Adipic Acid	39
Flavorants	41
Aspartame	3.8
Accesulfame K	3.8
Sodium citrate	29.2
Disodium phosphate	20

All of the ingredients are placed in a Hobart mixer and mixed for 5 minutes.

Gelatin dessert. A gelatin dessert is prepared by adding 465 ml of hot water to 8.6 grams of the gelatin dessert mix and stir. 465 ml of cold water is added and then the mixture is refrigerated until firm.



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**Example 6**

A flavored instant tea product (1000 g.) is prepared from the following ingredients:

Ingredient	Grams
Non-dairy creamer (50% fat)	400
Simplese® 100 (microparticulated whey protein)	150
Sucrose	278
Starch	50
Aspartame	1.0
Acesulfame K	1.0
Instant Tea	100
Silicon dioxide	10
Flavors	10

All of the ingredients are placed in a Hobart mixer and mixed for 5 minutes.

Flavored creamy tea beverage: A beverage (1000 ml) is prepared by mixing 82 grams of the dry mix and adding 918 ml of water at 180°F (82°C).

**Example 7**

A. Chocolate dry mix. A chocolate powder mix is prepared from the following ingredients:

Ingredient	%
Sweetening Agent according to Example 2	477.4
Beverage creamer	238.7
Sodium Chloride	6.36
Fermented Cocoa Powder, 14% fat	254.6
Colors	1.11
Citric Acid	7.95
Butylated Hydroxytoluene (BHT)	0.006
Vitamin Mix (vitamin C, riboflavin, niacin, thiamin and pantothenic acid)	7.33
Ferrous Fumarate	0.95
Mineral Mix (tribasic calcium phosphate)	0.794
Artificial Chocolate Flavor	4.80

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The chocolate powder is prepared by mixing the above ingredients together until the powder is homogeneous. A drinkable beverage is prepared by adding 25 g. of this powder to 240 ml of milk and then stirring vigorously.

- B. Ready-to-drink fortified beverage. Preparation of a ready-to-serve nutritionally fortified beverage can be carried out in a similar manner to the preparation of beverage mixes (see A above), at least as it relates to the dry ingredients such as the cocoa powder, beverage creamer, iron source, vitamins and other minerals, etc. The primary difference is the addition of an aqueous fluid, typically in an amount of from about 60 to about 98%, preferably from about 75 to about 95%, of the finished ready-to serve beverage product. Suitable aqueous fluids include water and milk. Suitable milk sources include whole milk, low fat milk, skim milk, milk fluids made by reconstituting milk powders with water and the like.

**Example 8**

The chocolate dry mix of Example 7 may be prepared using a sweetening agent prepared as set forth in any of Examples 1 or 3.

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What is claimed is:

1. A sweetening agent which comprises:
  - a) from 90 to 99.5%, preferably 95 to 99.3%, more preferably 96 to 99.2%, most preferably 98.4 to 99.2% sucrose, fructose, lactose or glucose, or any mixture thereof;
  - b) from 0.001 to 5%, preferably 0.005 to 1.0%, more preferably 0.01 to 0.1%, most preferably 0.8 to 0.4% aspartame;
  - c) from 0.001 to 5%, preferably 0.005 to 1.0%, more preferably 0.01 to 0.1%, most preferably 0.8 to 0.4% acesulfame K.
2. A sweetening agent according to any of the above claims wherein the sweetener is sucrose.
3. A sweetening agent according to any of the above claims wherein the sweetener is fructose.
4. A sweetening agent according to any of the above claims wherein the sweetener is lactose.
5. A sweetening agent according to any of the above claims wherein the sweetener is glucose.
6. A flavored soft drink mix comprising the sweetening agent of any of the above claims.
7. A flavored tea product comprising the sweetening agent of any of the above claims.
8. A medicinal product comprising the sweetening agent of any of the above claims.
9. A flavored coffee product comprising the sweetening agent of any of the above claims.

## INTERNATIONAL SEARCH REPORT

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<b>A. CLASSIFICATION OF SUBJECT MATTER</b> IPC 6 A23L1/09 A23L1/236 A23L2/60 A61K31/70 C13F3/00 A23F3/14 A23F5/14		
According to International Patent Classification (IPC) or to both national classification and IPC		
<b>B. FIELDS SEARCHED</b> Minimum documentation searched (classification system followed by classification symbols) IPC 6 A23L A61K C13F A23F		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practical, search terms used)		
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>		
Category *	Citation of document, with indication, where appropriate, of the relevant passages Relevant to claim No.	
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Information on patent family members

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